**Unit Conference: Reflection**

**By: Anu Jain, Jasmine Chong & Rinkal Patel**

1. **What are the learning goals and how were they addressed in this lab?**

The primary learning goal of this mystery resistor lab was to consolidate the concepts that students learned throughout the electricity unit. Through a process of inquiry, students were expected to create a circuit, and apply Ohm’s Law using their knowledge of potential difference, current and resistance to find the value of the resistor.

The second learning goal was to promote inquiry, problem-solving and teamwork. In this lab, students in groups of 3-4 people were given a simple problem but they were expected to develop their own methods, observation tables and graphs. It was expected that students analyze the data through the tools of slopes and math equations as well.

1. **What prior knowledge would the students be expected to have?**

Students were expected to understand the difference between series and parallel circuits before performing this lab. They should recall how to set up circuits (i.e. Ammeters are placed inside the circuit, voltmeters are placed outside the circuit, etc.). Students should also be familiar with calculations related to Ohm’s Law and slopes. Furthermore, students were expected to know the purpose of a resistor in real-life situations prior to this lab.

1. **What were the main differences between the traditional design and the inquiry approach used for your lab?**

The main difference between the recipe lab and the inquiry lab is that the inquiry lab was less structured and more open-ended. For example, the inquiry lab did not show the students how to set-up the circuit. Students were expected to devise their own circuits to collect data. In addition, the inquiry lab did not provide any observations tables or explicit directions for the students. Instead, the inquiry lab was written like a mystery case rather than a lab to engage students. Students were provided with clues rather than instructions and tools rather than materials. Although the inquiry lab allowed students to explore the procedure, the discussion questions and the evaluation rubric were the same for both labs. The questions and evaluation sheet posed as a guide for the students.

1. **What were the challenges you faced in design and/or implementation?**

The primary challenge in designing the inquiry lab was balancing how much information to give to the students. We did not want to take away too much information because students may become discouraged and give up altogether. Meanwhile, we wanted to promote critical thinking and application of the unit content. Assessing the inquiry lab is also difficult because every student may have a different strategy to solve the problem.

Another challenge was trying to make the lab interesting and meaningful to the students. We initially wanted the students to see the relationship between current and potential difference however, we decided to add a fun twist to the lab by adding a mystery resistor. The mystery component adds a sense of excitement to the lab.

The final challenge that we faced in the implementation of the lab is the physical constraints of the materials. This lab would be more effective if students were in groups of 3-4 people. However, due to the limitations in the number of working batteries, we had to group students into groups of 5. We also encountered problems with the switchboards because the current and potential difference at 3V and 9V were the same. The difficult process of inquiry and the added limitations of the materials made the implementation of the lab extremely challenging.

1. **What did you learn from the post-lab discussion?**

We learned a variety of strategies to improve our lab based on the post-lab discussion. The first idea is to assign a different role for each student in the group (i.e. Recorder, wire connector, reader, etc) so that everyone is involved. Some students may be more hands-on and others may be more passive in group work therefore, another suggestion was to occasionally switch the students’ roles to include everyone in the lab.

Based on the post-lab discussion, students generally liked the PhET simulation that we posted on the board. However, they suggested that students get a chance to play around with the simulation prior to the lab as a pre-lab exercise. Another idea that we will implement is to bridge the gap between different media. For instance, the voltmeter that the students used and the voltmeter from PhET looked different. Students may have trouble grasping that both voltmeters have the same function. From this discussion, we learned the importance of a pre-lab exercise to ease the transition into the actual lab.

This lab could be conducted using an online simulation however we opted for a hands-on approach because we wanted students to physically build a working circuit. One problem with the hands-on approach is that sometimes the materials may not work. For example, the batteries may not provide enough energy or the wires may carry too much resistance. One suggestion was to provide a working model for the students so that they could use it as a resource to help them build their own circuits. The only danger is that it takes away from the inquiry portion of the lab. Students may opt to copy the working model, instead of developing their own procedure. However, we concluded that the working model is useful when students become frustrated and need reassurance that their ideas are correct.

The final suggestion for this lab is to create a grab-bag of materials for the students. Some groups may finish early and want to try using other materials to create a circuit. As teachers, we need to anticipate students who have difficulty and students who need extra challenge.